

# Prevalence and determinants of second-hand tobacco smoking in Pakistan

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## Abstract

**Background:** Exposure to second-hand tobacco smoke is a public health problem in countries with high prevalence of active smoking such as Pakistan. However, few studies have assessed the prevalence and risk factors for exposure to second-hand tobacco smoke.

**Aims:** To estimate the prevalence and factors associated with exposure to second-hand tobacco smoke in Pakistan.

**Methods:** This study used data from the 2017–2018 Pakistan Demographic and Health Survey to calculate the prevalence and determinants of second-hand tobacco smoke exposure. Sociodemographic characteristics, family size and exposure to media by the respondents were the independent variables. The chi-square test and logistic regression analyses were used to evaluate the relationship between exposure to second-hand tobacco smoke and the independent variables.

**Results:** The survey included 61 940 adults, of which 30 027 (48.5%) were males and 31 913 (51.5%) females. The overall prevalence of exposure to second-hand tobacco smoke was 34.3%: 35.6% among males and 33.2% among females. Higher education level and rural residence were significantly positively associated with exposure to second-hand tobacco smoke among both sexes. Having a radio was inversely associated with exposure while having a television was positively associated with exposure among both sexes. Large family size was inversely associated with exposure. Currently and previously married females had significantly greater risk of exposure than never-married females.

**Conclusion:** Tailored health interventions and policies are needed that target populations at high-risk of exposure to second-hand tobacco smoke. Strict smoking bans in public places should be implemented to limit exposure to second-hand tobacco smoke in Pakistan.

Keywords: second-hand smoking, tobacco smoke pollution, prevalence, risk factors, Pakistan.

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## Introduction

Tobacco smoke is one of the leading causes of death worldwide. It affects the health of the smokers and it is a threat to the lives of people inhaling second-hand smoke (1). According to the Global Burden of Disease Study 2013, second-hand tobacco smoke causes 600 000 deaths a year worldwide (2). Second-hand smoke exposure is associated with a risk of several diseases including cancer, diabetes, stroke and asthma (3–5). In children, second-hand tobacco smoke causes sudden infant death syndrome and other respiratory diseases, and is associated with preterm deliveries and lower weight of newborn babies in pregnant women (6).

The prevalence of exposure to second-hand tobacco smoke is considerably higher in low- and middle-income countries such as Pakistan (7). Tobacco is used in many different forms in Pakistan including as hookah and shisha. According to the 2014 Global Adult Tobacco Survey, the prevalence of active smoking in Pakistan was 19.1% while exposure to second-hand tobacco smoke was 69.1% and 48.3% at the workplace and home, respectively

(8). In the Pakistan Demographic and Health Survey for 2012–2013, 39.1% of people were exposed to indoor tobacco smoke every day (8). Tobacco consumption including second-hand smoking is the fourth leading cause of death and disability in Pakistan (9). Second-hand tobacco smoke exposure caused 33 524 deaths in Pakistan in 2017, which was 2.37% of the total deaths (9).

As second-hand tobacco smoke exposure is a major public health threat in Pakistan, calculating the precise prevalence and identifying high-risk population groups can support evidence-based policies on banning smoking. However, adequate research in this field is lacking in Pakistan. Previously, most of the studies in Pakistan focused on the prevalence and determinants of active smoking (8,10). The few studies on second-hand tobacco smoke mostly focused on knowledge and attitude of people towards active and passive smoking (11,12). Some studies analysed the relationship between second-hand tobacco smoke and specific diseases such as respiratory diseases and pregnancy outcomes (13,14), and a few calculated the prevalence of exposure to second-hand

tobacco smoke in a specific region or age group (12,15). We found only one study that calculated second-hand tobacco smoke prevalence at the national level in Pakistan (16). However, this study did not consider all the factors that can affect the prevalence of exposure to second-hand tobacco smoke. Most of these previous studies are outdated and are not based on the latest information on second-hand tobacco smoke exposure in Pakistan.

Therefore, this study aimed to calculate the prevalence of second-hand tobacco smoke exposure in Pakistani adults, disaggregated by sex, using the latest data from the 2017–2018 Pakistan Demographic and Health Survey. We analyzed the association between socioeconomic characteristics, family type and media-related factors and the prevalence of exposure to second-hand tobacco smoke. The results of this study will be useful for policymakers' interventions focusing on high-risk groups.

## Methods

### Data source

This study used secondary data from the 2017–2018 Pakistan Demographic and Health Survey (17), a nationally representative household survey which provides the most recent and reliable data on a wide range of indicators, including maternal health, women's empowerment, domestic violence and HIV and AIDS. The data are freely accessible. This survey included four provinces of Pakistan: Punjab, Sindh, Khyber Pakhtunkhwa and Balochistan, as well as Azad Jammu and Kashmir and the former Federally Administered Tribal Areas, which were not included in the previous surveys.

The Pakistan Demographic and Health Survey included 16 240 households selected by two-stage, stratified, random sampling. In the first stage, all the regions were separated into urban and rural populations and divided further into small areas called enumeration blocks. In the second stage, households were selected from each block using random sampling design (17). For this study, we included males and females aged 15 years and older, both smokers and non-smokers.

### Variables

The outcome variable was exposure to second-hand tobacco smoke. Respondents were asked how frequently household members smoked inside the house with four response categories: never, daily, weekly and monthly. We recoded the responses into no or yes.

The independent variables were sociodemographic characteristics of the respondents, family and media-related factors. Sociodemographic variables included: age group (15–35, 36–59, ≥ 60 years); level of education (no education, primary or secondary level, higher education); wealth index measured in quartiles (poor, middle, rich); place of residence (urban, rural); and region of residence (Punjab, Sindh, Balochistan, Khyber Pakhtunkhwa, other). Others included Gilgit Baltistan, Azad Jammu Kashmir, Federally Administered Tribal Areas and

Islamabad Capital Territory. Family-related factors included family size (2, 3–5, > 5 members) and marital status (never married, currently married, previously/ever married). Media-associated variables were having a radio, a television, the internet; responses for all three categories were coded no or yes.

### Statistical analysis

SPSS version 20 was used to analyse the data. To account for complex sampling design, weighted data were used to produce nationally representative results. Descriptive statistics were calculated and the chi-square test was used to assess the association between exposure to second-hand tobacco smoke and the independent variables. Binary logistic regression analysis was used to calculate the adjusted effects of the different variables on the prevalence of exposure to second-hand tobacco smoke. Results were presented separately for males and females.

### Ethical considerations

No ethical approval was needed for this study because we used secondary data from the Pakistan Demographic and Health Survey. These data are publicly available (17). Consent was not needed from subjects because we used already collected anonymized data from a national survey.

## Results

The total sample size was 61 940; 30 027 (48.5%) males and 31 913 (51.5%) females. Respondents were aged 15–85 years. Of the total sample, 34.3% (21 271/61 940) were exposed to second-hand tobacco smoke. Of males, 35.6% (10 686/30 027) were exposed to second-hand tobacco smoke compared with 33.2% (10 585/31 913) of females. Table 1 shows prevalence of exposure to second-hand tobacco smoke in males and females by independent variables. In the younger population, the prevalence of exposure to second-hand tobacco smoke was higher in females while exposure in the older age group was greater in males ( $P < 0.001$ ). Greater proportions of males with primary, secondary or higher education level were exposed to second-hand tobacco smoke than females of the same education level ( $P < 0.001$ ). The prevalence of exposure to second-hand tobacco smoke was higher in males than females in urban areas. A greater proportion of males living in a two-member family reported exposure to second-hand tobacco smoke than females, as did never-married males.

Logistic regression analysis showed that higher education versus no education, living in rural rather than urban areas, and being in the high or middle wealth index versus low wealth index were positively and significantly associated with second-hand tobacco smoke exposure in both males and females (Table 1). Compared with Punjab, both males and females in Sindh and other areas had a significantly greater odds of second-hand tobacco smoke exposure, while males and females in Khyber Pakhtunkhwa and Balochistan had significantly lower odds. In both males and females,

**Table 1** Prevalence of exposure to second-hand tobacco smoke in males and females, by sociodemographic characteristics and media exposure, Pakistan

Variable	Exposure to second-hand tobacco smoke, %		$\chi^2$ (P-value)
	Males (n = 10 686)	Females (n = 10 585)	
<b>Age, in years</b>			69.5 (< 0.001)
15–35	48.9	51.1	
36–59	50.2	49.8	
≥ 60	58.2	41.8	
<b>Education</b>			992.1 (< 0.001)
No education	37.3	62.7	
Primary or secondary	60.1	39.9	
Higher	56.5	43.5	
<b>Wealth index</b>			0.7 (0.71)
Poor	50.4	49.6	
Middle	49.7	50.3	
Rich	50.3	49.7	
<b>Residence</b>			5.3 (0.02)
Urban	51.1	48.9	
Rural	49.5	50.5	
<b>Region</b>			5.4 (0.24)
Punjab	50.5	49.5	
Sindh	51.7	48.3	
Khyber Pakhtunkhwa	48.9	51.5	
Balochistan	50.0	50.0	
Other <sup>a</sup>	49.7	50.3	
<b>Has internet connection</b>			2.0 (0.08)
No	50.0	50.0	
Yes	51.4	48.6	
<b>Has radio</b>			7.5 (0.05)
No	50.6	49.4	
Yes	47.4	52.6	
<b>Has television</b>			0.1 (0.72)
No	50.4	49.6	
Yes	50.1	49.8	
<b>Family size, no. of members</b>			16.0 (< 0.001)
2	57.1	42.9	
3–5	52.4	47.6	
> 5	49.6	50.4	
<b>Marital status</b>			372.0 (< 0.001)
Never married	58.3	41.7	
Currently married	47.5	52.5	
Previously/ever married	32.8	67.2	

<sup>a</sup> Gilgit Baltistan, Islamabad Capital Territory, Azad Jammu Kashmir and Federally Administered Tribal Areas.

having a radio was significantly negatively associated with second-hand tobacco smoke exposure while having a television was positively associated. In males, having internet connections was significantly positively associated with second-hand tobacco smoke exposure. The odds of exposure to second-hand tobacco smoke were significantly lower in large families than two-

member families for both males and females. Previously married males had significantly lower odds of exposure to second-hand tobacco smoke than never married males. However, both currently and previously married females had significantly greater odds of exposure to second-hand tobacco smoke than never married females.

**Table 2** Factors associated with second-hand tobacco smoke exposure in males and females, Pakistan: logistic regression analysis

Variable	Males OR (95% CI)	Females OR (95% CI)
<b>Age, in years</b>		
15–35	Ref	Ref
36–59	0.94 (0.86–1.02)	0.87* (0.79–0.97)
≥ 60	0.97(0.89–1.06)	0.92 (0.835–1.02)
<b>Education</b>		
No education	Ref	Ref
Primary or secondary	1.58* (1.457–1.716)	1.20* (1.10–1.31)
Higher	1.40* (1.31–1.50)	1.14* (1.06–1.24)
<b>Wealth index</b>		
Poor	Ref	Ref
Middle	1.27* (1.17–1.38)	1.28* (1.18–1.39)
Rich	1.34* (1.24–1.44)	1.43* (1.33–1.54)
<b>Residence</b>		
Urban	Ref	Ref
Rural	1.12* (1.06–1.19)	1.12* (1.06–1.19)
<b>Region</b>		
Punjab	Ref	Ref
Sindh	1.67* (1.56–1.78)	1.75* (1.64–1.87)
Khyber Pakhtunkhwa	0.86* (0.80–0.93)	0.98(0.91–1.05)
Balochistan	0.56* (0.52–0.61)	0.60* (0.56–0.66)
Other <sup>a</sup>	1.29* (1.19–1.40)	1.58* (1.46–1.72)
Media exposure	Ref (No)	
Has internet connection	1.14* (1.06–1.24)	1.066 (0.986–1.151)
Has radio	0.70* (0.65–0.76)	0.77* (0.71–0.83)
Has television	1.27* (1.19–1.35)	1.24* (1.16–1.31)
<b>Family size, no. of members</b>		
2	Ref	Ref
3–5	0.66* (0.55–0.80)	0.45* (0.37–0.55)
> 5	0.74* (0.70–0.79)	0.65* (0.61–0.69)
<b>Marital status</b>		
Never married	Ref	Ref
Currently married	0.93(0.80–1.08)	1.32* (1.17–1.48)
Previously/ever married	0.85* (0.74–0.98)	1.32* (1.19–1.46)

OR: odds ratio; CI: confidence interval; Ref: reference category.

<sup>a</sup> Gilgit Baltistan, Islamabad Capital Territory, Azad Jammu Kashmir and Federally Administered Tribal Areas.

\*Significant at  $P < 0.05$ .

## Discussion

Our analysis showed a high rate of exposure to second-hand tobacco smoke in Pakistan (34.3%), which is comparable with previous studies from other Asian countries (18,19). A study in Bangladesh found that 43% of non-smoking adults were exposed to second-hand tobacco smoke at home (20). In our study men had higher rates of exposure to second-hand tobacco smoke than women (35.6% versus 33.2%) which is consistent with other studies (21,22). Greater exposure of men in other environments such as public places and workplaces may explain the higher exposure of men to second-hand tobacco smoke in traditional societies. We could not

examine second-hand tobacco smoke exposure by place of exposure (at home or in other places) and sex as the data did not provide this information.

In our study, exposure to second-hand tobacco smoke differed by age group, region, socioeconomic status and education level, which concurs with previous studies (23,24). Rural and wealthier respondents in Pakistan were at increased risk for second-hand tobacco smoke exposure. This pattern is consistent with a study in tobacco-cultivating rural areas of China (21). In our study, respondents in Sindh, which is the largest province of Pakistan by area and second largest province by population, had the highest odds of second-hand tobacco

smoke exposure. These findings underscore the need to devise appropriate policies and programmes at the provincial level to reduce second-hand tobacco smoke exposure in this region. Focus should be on creating tobacco-smoke-free environments with implementation of smoke-free laws in all public places, such as education institutes, health care facilities, workplaces, shopping malls, train and bus stations, and places of entertainment.

Regarding education, respondents with primary and higher education were 1.2 times more likely to report second-hand tobacco smoke exposure than those with no education. A higher proportion of male respondents with higher education levels were exposed to second-hand tobacco smoke than females with similar educational backgrounds. This differs from other studies that showed that a higher level of education was negatively associated with smoking behaviour (25), and that educated people had better risk perceptions of many environmental health risks and protective factors against them (26). However, this association and explanation is less likely to be true in developing countries where people, despite higher levels of education, are at increased odds of exposure to hazardous work environments. Such disparities have also been observed in developing countries where educated Black and Hispanic people were at increased risk of second-hand tobacco smoke exposure than White educated people (27). Thus, higher education, despite being a significant determinant of health behaviour, does not guard all people against exposure to second-hand tobacco smoke. Social influences and cultural factors contribute to the health behaviour of the general population. Tobacco use is associated with masculinity in some patriarchal societies (28). These findings emphasize the need to recognize the complex interaction of these factors in developing countries which can help policymakers devise effective anti-smoking interventions focused on people of higher education status.

People who reported access to the internet and television at home were significantly more likely to report second-hand tobacco smoke exposure. This association may be connected with fancy advertisements and scenes in movies showing heroes as smokers. Although, these advertisements and scenes carry written health warnings, visual effects are more effectual and memorable. Television and media campaigns focus more on the health effects of active smoking rather than on health risks of second-hand tobacco smoke. Therefore, policymakers should seek to raise awareness on the dangers of second-hand tobacco smoke through television and the internet and ban content that promotes smoking and tobacco products. Educational campaigns should develop messages that target both males and females bearing in mind the specific contexts that increase their vulnerability. For instance, second-hand tobacco smoke exposure of males is more likely to be in their work environment, whereas females are more likely to be exposed to second-hand tobacco smoke in their home settings. In this study 33.2% of the women reported second-hand tobacco smoke exposure, which

is alarmingly high. Addressing the hazards of second-hand tobacco smoke exposure at the grass-roots level by creating smoke-free homes has been recommended (29).

Women who were currently married or ever married were 1.3 times more at risk of second-hand tobacco smoke exposure than unmarried women. In Middle Eastern and Asian societies, the rates of tobacco smoking are relatively low among women because social norms usually disapprove of women smoking (30,31). However, these women are often at increased risk of second-hand tobacco smoke exposure because of the tobacco use of their husbands, fathers or brothers (32). Women are not empowered enough to stop their male relatives from smoking; thus spreading information to whole families, especially men, about the effects of second-hand tobacco smoke exposure on health could be helpful. Indeed, even educated people perceive second-hand tobacco smoke as non-hazardous, therefore, it is important to create more awareness about the health-related effects of second-hand tobacco smoke across all education groups.

In our study, the risk of exposure to second-hand tobacco smoke was greater among respondents of higher socioeconomic status, which contradicts previous studies that demonstrated an inverse relationship between income and second-hand tobacco smoke exposure (33) or no relationship (21). The reasons for this difference in findings are unclear but it suggests that people of all socioeconomic levels are at risk of exposure to second-hand tobacco smoke and interventions should focus both on rich and poor communities. We found that people living in tribal regions such as Federally Administered Tribal Areas, Gilgit Baltistan, and Azad Jammu Kashmir were at a higher risk of exposure to second-hand tobacco smoke than those in Punjab. The positive relationship between better wealth status and second-hand tobacco smoke exposure could be due to confounding variables such as region of residence.

Our study has some limitations. First, the analysis is based on secondary data obtained from a demographic health survey in Pakistan which measured exposure to second-hand tobacco smoke through self-reporting. Second, the survey did not provide information on frequency of second-hand tobacco smoke exposure and the environments in which respondents were exposed. Lastly, we did not analyse the prevalence of second-hand tobacco smoke exposure among non-smokers. Despite these limitations, our findings indicate the need for all-inclusive interventions to prevent second-hand tobacco smoke exposure for all populations and directions for future research to obtain comprehensive data about the predictors of second-hand smoke exposure and its effect on health in Pakistan.

In conclusion, the prevalence of second-hand smoke exposure is quite high in Pakistan and needs the attention of the public health authorities.

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**Competing interests:** None declared.

## Prévalence et déterminants du tabagisme passif causé par la cigarette au Pakistan

### Résumé

**Contexte :** L'exposition à la fumée secondaire de cigarette est un problème de santé publique dans les pays où la prévalence du tabagisme actif est élevée tels que le Pakistan. Cependant, peu d'études ont évalué la prévalence du tabagisme passif et les facteurs de risque y afférents.

**Objectifs :** Estimer la prévalence de l'exposition à la fumée secondaire de cigarette ainsi que les facteurs associés à celle-ci au Pakistan.

**Méthodes :** La présente étude a utilisé les données de l'enquête démographique et sanitaire 2017-2018 du Pakistan pour calculer la prévalence et les déterminants de l'exposition passive à la fumée de cigarette. Les caractéristiques sociodémographiques, la taille de la famille et l'exposition des répondants aux médias constituaient des variables indépendantes. Le test du chi carré et les analyses de régression logistique ont été utilisés pour évaluer la relation entre l'exposition passive à la fumée de cigarette et les variables indépendantes.

**Résultats :** L'enquête portait sur 61 940 adultes, dont 30 027 (48,5 %) étaient des hommes et 31 913 (51,5 %) des femmes. La prévalence globale du tabagisme passif était de 34,3 % : 35,6 % chez les hommes et 33,2 % chez les femmes. Un niveau d'éducation plus élevé et la résidence en milieu rural étaient associés de manière significativement positive à l'exposition à la fumée secondaire chez les deux sexes. Le fait de posséder une radio était inversement associé au tabagisme passif, tandis que le fait de posséder une télévision était positivement associé à ce type d'exposition chez les deux sexes. La grande taille de la famille était inversement associée au tabagisme passif. Les femmes mariées au moment de l'étude et précédemment présentaient un risque d'exposition passive à la fumée de cigarette considérablement plus élevé que les femmes jamais mariées.

**Conclusion :** Des interventions et des politiques sanitaires adaptées sont nécessaires pour cibler les populations à haut risque d'exposition à la fumée secondaire de cigarette. Des interdictions strictes de fumer dans les lieux publics devraient être mises en œuvre pour limiter l'exposition au tabagisme passif au Pakistan.

### معدل انتشار تدخين السجائر غير المباشر ومحدداته في باكستان

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### الخلاصة

الخلفية: يمثل التعرض لدخان السجائر غير المباشر مشكلة من مشكلات الصحة العامة في البلدان التي يرتفع فيها معدل انتشار التدخين النشط، مثل باكستان. إلا أنه لا يوجد سوى عدد قليل من الدراسات التي قيمت مدى انتشار التعرض للدخان غير المباشر، وعوامل الخطر المرتبطة بهذا التعرض.

الأهداف: هدفت هذه الدراسة الى تقدير معدل انتشار التعرض لدخان السجائر غير المباشر والعوامل المرتبطة بذلك التعرض في باكستان.

طرق البحث: استخدمت هذه الدراسة بيانات من المسح السكاني والصحي لباكستان لعام 2017-2018، لحساب معدل انتشار التعرض لدخان السجائر غير المباشر ومحددات ذلك التعرض. وقد بحثت الدراسة متغيرات مستقلة، هي: السمات الاجتماعية والسكانية، وعدد أفراد الأسرة، ومدى تعرض من أجابوا عن الاستبيان لوسائل الإعلام. واستخدم اختبار مربع كاي وتحليلات الانحدار اللوجستي لتقييم العلاقة بين التعرض لدخان السجائر غير المباشر والمتغيرات المستقلة.

النتائج: شملت الدراسة 61 940 بالغاً، منهم 30 027 (48.5%) من الذكور و 31 913 (51.5%) من الإناث. وبلغ المعدل العام لانتشار التعرض للدخان غير المباشر 34.3% : 35.6% بين الذكور و 33.2% بين الإناث. وقد ارتبط ارتفاع مستوى التعليم والعيش في الريف ارتباطاً إيجابياً كبيراً بالتعرض لدخان السجائر غير المباشر بين الجنسين. وفيما يتعلق بوسائل الإعلام، ارتبط امتلاك مذياع ارتباطاً عكسياً بالتعرض، في حين ارتبط امتلاك التلفزيون ارتباطاً إيجابياً بالتعرض بين الجنسين. وقد ارتبط كبر عدد أفراد الأسرة ارتباطاً عكسياً بالتعرض. وقد زادت احتمالات التعرض بين الإناث المتزوجات حالياً واللاتي كن متزوجات من قبل زيادة كبيرة عن الإناث اللاتي لم يسبق لهن الزواج.

الاستنتاجات: هناك حاجة إلى وضع تدخلات وسياسات صحية مُصممة كي تلائم فئات السكان ممن يزيد خطر تعرضهم لدخان السجائر غير المباشر، وتكون موجهة إليهم. وينبغي تطبيق حظر صارم للتدخين في الأماكن العامة في باكستان، للحد من التعرض لدخان السجائر غير المباشر.

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